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*Biomass Densification Systems*

User's Manual and Reference Guide:

**109743**



# User's Manual and Reference Guide:

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## **1.0 GENERAL INFORMATION**

### **1.1 Machine Overview:**

This machine is designed to take products that are conditioned for pelleting. Introducing products that are not conducive for pelleting (rock, metal, unconditioned wood) will damage the pellet mill and void all warranties.

The pelleting process requires high compression, heat and torque to produce a pellet. Operator safety must be the first thought of all pelleting systems. Disregarding Safety and Warnings could result in injury or death.

The PM8PTO requires a minimum of a 15HP tractor to operate. It has been supplied with a PTO connector and frame that must be installed per recommendation of your tractor's manufacturer. The gearbox the Pellet Mill utilizes is at a 3:1 ratio, the pellet quality has a lot to do with the proper speed of the PTO. In most cases, the required PTO speed is between 300-400 RPMs.

### **1.2 Safety and Warnings:**

#### **WARNING**

**INTERNAL MOVING PARTS ARE DANGEROUS!**

**BEFORE ATTEMPTING TO SERVICE OR PRIOR TO INTERNAL INSPECTION,  
DISCONNECT PTO SHAFT FROM POWER SOURCE (TRACTOR PTO).**

**DO NOT OPERATE THIS EQUIPMENT WITHOUT  
REQUIRED SAFETY GUARDS AND COVERS IN PLACE**

**KEEP HANDS CLEAR OF INLETS AND DISCHARGES**

*Biomass Densification Systems*

## 2.0 MACHINE SUMMARY

### 2.1 Machine specifications:

#### PM8PTO PELLET MILL

No. of Dies in Mill.....	1
Die Size.....	8" Ø x 1 – ½" Thick
No. of Rollers in Mill .....	2
Roll Size.....	4" Ø x 2" Wide
Machine Extreme Height.....	48"
Machine Extreme Length.....	25"
Machine Extreme Width.....	24"
Machine Length on Floor.....	25"
Machine Width on Floor.....	24"
Machine Height Where Input Material Enters.....	48"
Shipping Weight.....	550 lbs.
Net Machine Weight.....	450 lbs.

#### ***Approximate Capacities (lbs.per our.)\****

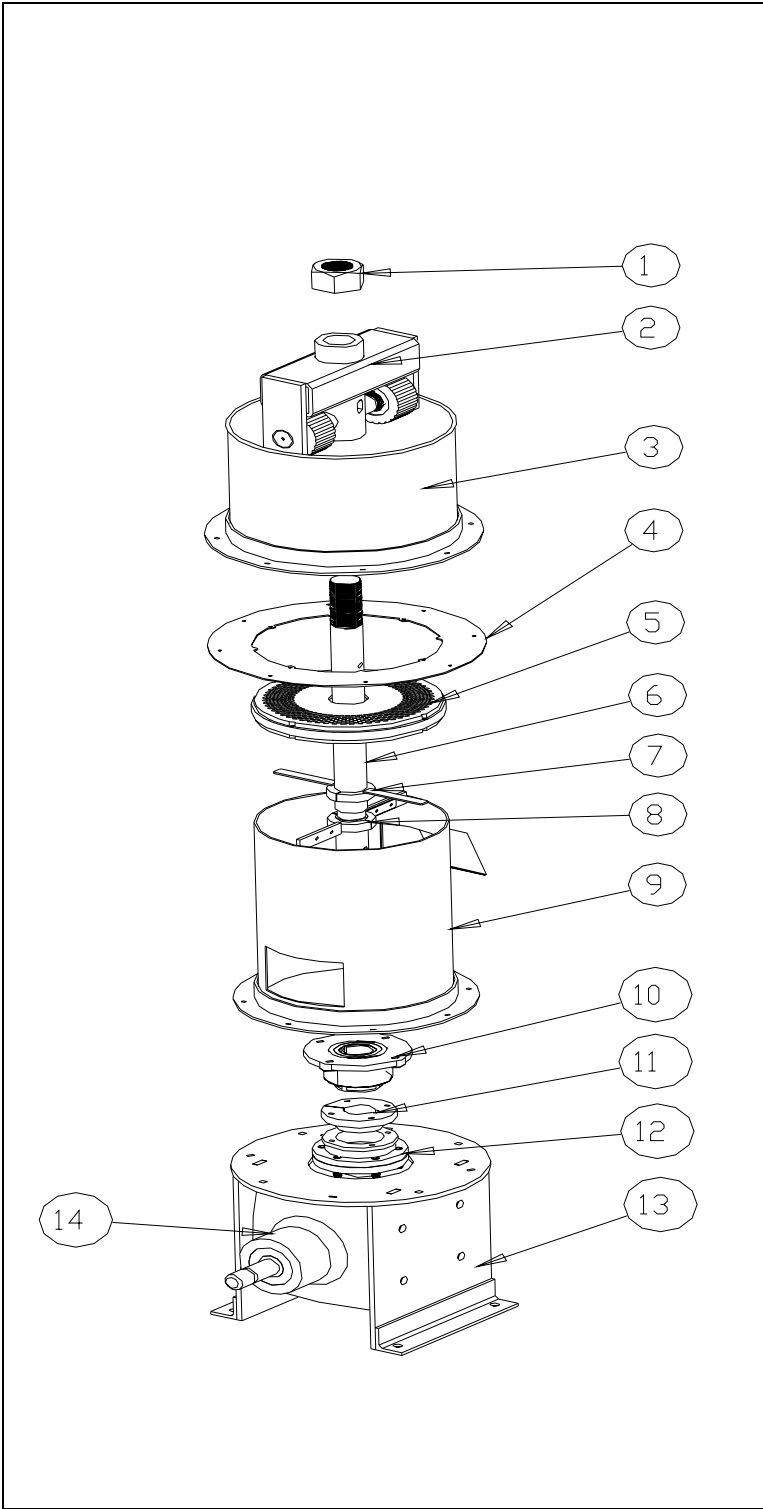
Grasses (finely ground under ¼" Size ).....	300-400
Biomass Material, Generic (finely ground under ¼" Size ).....	300-400
Wood, hardwood sawdust (finely ground under ¼" Size ).....	150-250

#### Horse Power Requirements:

Main Drive, PTO.....	Suggested, 15-25 HP, 540 RPM
Main Drive, PM805.....	5 HP, 1 Phase, 115/230 Volt, 60 Hz, 1800 RPM
Main Drive, PM805.....	5 HP, 3 Phase, 230/460 Volt, 60 Hz, 1800 RPM
Main Drive, PM810.....	10 HP, 1 Phase, 115/230 Volt, 60 Hz, 1800 RPM
Main Drive, PM810.....	10 HP, 3 Phase, 230/460 Volt, 60 Hz, 1800 RPM
Main Drive, PM820.....	20 HP, 3 Phase, 230/460 Volt, 60 Hz, 1800 RPM

\*All Capacities will vary depending upon size, moisture levels, and impurities of incoming material.

2.2 Machine configuration:



PM8PTO  
8" PTO DRIVEN  
PELLET MILL

No.	Qty.	Part No.	Description
1	1	1-½ "-8 Nut	Main Nut
2	1	PM8-RF	Roller Frame
3	1	PM8-0006	Hopper
4	1	PM8-0009	Hopper Flange
5	1	PM8-0001	1-1/2"X8" Die
6	1	PM8-0011	Main Shaft
7	1	PM8-0017	Cutting Blade
8	1	PM2-0019	Wiper
9	1	PM81-0020	Housing
10	1	PM12-0039	Thrust Bearing
11	1	PM12-0042	Bushing
12	1	PM12-0120	Coupler Plate
13	1	PM12-44,45	Frame Support
14	1	PM12-0027	Gear Box

## **2.3 General Maintenance:**

### **2.3.1 Lubrication**

Be sure all bearings are properly lubricated with a quality grade of pressure grease. For pellet mills operating in extreme seasonal ambient temperatures the type of grease used should take into account the seasonal temperature changes. The pellet mill should be lubricated at regular intervals depending on the location of the bearing.

Bearings should be lubricated after every 250 hours of operation. One or two pumps on a **standard hand pump grease** gun is sufficient. **High-pressure air operated grease guns are not recommended!**

After initial lubricating of bearings, they should be lubricated once every 100 hours. Again, **High-pressure air operated grease guns are not recommended!**

### **2.3.2 Die Inspection & Maintenance**

The die should be visually inspected prior to each start-up and after shut down. Inspection entails visual appraisal of the die, ensuring no foreign objects are lodged in die borings and checking for excessive wear. Each die has a longevity of 1500 hours under normal running conditions. Each side is expected to run 750 hours before removing and run on opposite side.

### **2.3.3 Roller Inspection & Maintenance**

The rollers should be visually inspected prior to each start-up and after shut down. Inspection entails visual appraisal of each roller, ensuring no foreign objects are impeding the free rolling motion of the rollers and checking for any excessive wear. Roller longevity is expected to be 3000 hours.

## **3.0 GETTING STARTED**

### **3.1 Understanding Your Material:**

#### **3.1.1 Proper Moisture**

Most organic material pelletizes when the moisture content is between 10 and 15%. The moisture aids in the densification process where it is a means to transfer heat from the die to the material, whereby the lignin within the organic matter melts and acts like a glue to hold the material in a pelleted form.

Without the proper moisture, heat does not transfer properly and the material does not heat up enough to create a good pellet. The pellet will crumble.

With too much moisture, the die never gets hot enough to create a pellet and the material coming out will crumble as well.

#### **3.1.2 Particle Size**

Prior to pelletizing your material, the incoming material needs to be reduced in size. Various machines may be used as size reduction tools. Some machines are, Hammer Mills, Shredders, and Chippers.

The size of the material may vary depending upon incoming feed stock. Follow the following guidelines for incoming material sizes:

Cellulosic Material* (Cardboard & Paper)	¾"-1" Ø
Biomass Material (Crop Residue, Grasses)	less than ¼" Ø
Woody Material (Sawdust)	less than ¼" Ø

\*Special care should be taken to not shred paper material into light-weight fluffy material, it will not flow and moisture levels will make it tricky to pellet.

### **3.2 Warming-Up the Pellet Mill:**

The die inside the pellet mill needs to be between 200° and 220° F to properly make a pellet. Of course the temperature necessary to make a pellet will vary from material to material. A list of materials and the proper die temperature needed is in Chart 1.

In order to obtain the proper temperature the mill needs to be warmed up. If your mill is equipped with a die warmer, simply turn on the die warmer and wait for the die to reach the optimum temperature. This should take approximately 5 minutes.

If there is no die warmer equipped on your mill, the die will need to be warmed manually. In order to do so, please follows the following procedure.

#### **MANUAL DIE WARMING PROCEDURE**

1. Input material must be ideal for pellet production. It must have the proper moisture content and lignin content.
2. Place a bucket or catcall of some kind under the discharge of the pellet mill. Material collected will be re-run through the mill to aide in warming the mill.
3. Turn the power on to the mill.
4. Slowly introduce organic material to be pelleted into the input funnel. Do not overflow the chamber.
5. After a few minutes the mill will begin to expel ground material or a poorly formed pellet. Continue to add material to the mill input chamber, being careful not to overfill the chamber.
6. As the die begins to warm you will observe water vapor exiting the top of the input funnel. This is an indication that the die is beginning to warm up.
7. Once you begin to see vapor, take the material collected at the discharge and reintroduce the material into the input funnel.
8. The die will prove to be warm enough to produce pellets when pellets being discharged are durable and compressed. At this point the pellet may not be hard, but as it cools it will harden. The die is now ready for continued pellet production.



### **3.3 Die Conditioning:**

A replacement die will be shipped to you in a pre-conditioned state, that is, no material has been run through the die. The following procedure needs to be followed to condition your die for production of pellets.

#### **Die Conditioning Procedure**

1. Place receiving bucket at mill discharge.
2. Power up pellet mill.
3. Pour pellet conditioning material into mill input chamber through funnel at a gradual rate, being careful to not overfill chamber.
4. Material will begin to flow through the die, as the material flows through, it will begin to take the scale out of the die cavities through friction.
5. Continue to pour material into mill, when finished feeding material, remove bucket from discharge and pour contents back into input chamber and recycle material. This process should be performed over and over for approximately 10minutes or 10 times.

## **4.0 TROUBLE SHOOTING**

### **4.1 Understanding the Problem:**

#### **MILL WILL NOT START**

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Improper Wiring	-Check system to ensure that motor is wired correctly.
Rollers have seized	-Disconnect Power Source.  -Check for debris in front of rollers, if debris is present, remove.  -After debris is removed, reconnect power and restart mill.
Rollers have seized	-If mill still does not start after above remedy solution, contact factory.

#### **PELLET WILL NOT FORM**

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Improper Input Material	-Check input material for proper moisture level. Moisture content shall be between 10-15% for proper pelletizing to occur.  -Check input material for proper amount of lignin. If material is not organic in nature, it will not have lignin and therefore will not be able to be pelletized.

#### **DIE HAS SEIZED**

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Material is too dry and die is not properly lubricated	-Clean die by soaking with glycerin (length of time for soaking depends upon material in die, woody material may take 24 hours of soaking before releasing from die.)  -Drill out individual borings with hand drill.

### ***Understanding the Problem continued:***

#### ***PELLETS TOO DRY***

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Lack of moisture in feedstock	Add water or moist material prior to pelletizing

#### ***PELLETS TOO WET***

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Too much moisture in feedstock	Dry material or mix with lower moisture material

#### ***LACKLUSTER PELLETS***

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Low pellet temperature	Allow mill to heat up
Wet infeed material	Allow mill to heat up
Dry infeed material	Allow mill to heat up

#### ***NON-DURABLE PELLETS***

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Pellets not cooled properly	Cool pellets on screen or cooling conveyor
Low pellet temperature	Allow mill to heat up

#### ***EXCESSIVE WEARING OF DIE AND OR ROLLERS***

<b>POSSIBLE CAUSES</b>	<b>REMEDY</b>
Foreign matter in infeed material	Always use clean biomass material
Improperly prepared material	Hammer mill or screen to the correct particle size

## **WARNING!**

**Do not attempt to work on, clean or service this equipment or open or remove any protective cover, guard, grate or maintenance panel until the power has been turned off and locked out and the machine has come to a complete stop.**

### **WARNING**

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